

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of)	
)	
Service Rules for the 698-746, 747-762 and 777-792 MHz Bands)	WT Docket No. 06-150
)	
Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band)	PS Docket No. 06-229
)	
Amendment of Part 90 of the Commission's Rules)	WP Docket No. 07-100

FOURTH FURTHER NOTICE OF PROPOSED RULEMAKING

REPLY COMMENTS OF COCO COMMUNICATIONS CORP.

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INTRODUCTION

CoCo Communications Corp. (CoCo) submits these reply comments in response to the Federal Communications Commission's (Commission) Fourth Further Notice of Proposed Rulemaking (Fourth Further Notice) regarding the 700 MHz spectrum block and the Nationwide Broadband Interoperable Public Safety Network (NBIPSN).

CoCo was founded in 2002 to assist in resolving issues related to our nation's public safety communications infrastructure. CoCo has developed innovative products and technology solutions in the areas of wireless mobile networking and public safety interoperability that have been deployed with a variety of state, local, and federal customers. CoCo has also deployed radio interoperability solutions in response to the Department of Homeland Security's (DHS) Information Technology and Evaluation Program (ITEP) grant program¹, provided input to the Department of Commerce's Public Safety

¹ http://www.dhs.gov/xnews/releases/press_release_0515.shtm, http://www.cococorp.com/press_DLFSessions.html

Interoperable Communications (PSIC) grant criteria², assisted Urban Area Security Initiative (UASI) customers³ including assistance during the Deepwater Horizon disaster response, and has deployed interoperability solutions to local school districts. A variety of Department of Defense (DoD) and DHS customers have used our Man-to-Man networking technology to solve in-building, interoperability, and coverage-related communications problems. These systems provide public safety and military personnel with mission critical off-network communications when their primary infrastructure fails or is congested.⁴

CoCo welcomes this timely opportunity to provide feedback to the Commission with the intent of improving our nation's public safety communications infrastructure.

SUMMARY

CoCo supports the Commission's efforts to create a Nationwide, Broadband, Interoperable Public Safety Network in the 700MHz band, but absent further Commission action and definition, the network will not meet users' requirements.

The Fourth Further Notice identifies some of these functional shortfalls – in particular, coverage and in-building communications – and misses others. The Notice completely omits any discussion of mission critical off-network, also known as “Direct/Talk Around,” communications. This capability is identified as a “critical element” of Mission Critical Voice Communications by the National Public Safety Telecommunications Council (NPSTC) Broadband Working Group,⁵ and must be addressed in any plans for a unified Public Safety Broadband Communications architecture.

² Department of Commerce National Telecommunications and Information Administration (NTIA) Public Safety Interoperable Communications (PSIC) Grant Program, <http://www.ntia.doc.gov/psic/>

³ New Orleans Region Urban Area Security Initiative, <http://www.neworleansuasi.org/>

⁴ U.S. Coast Guard Boarding Team Communications, U.S. Navy Damage Control Communications System

⁵ Functional Description MCV v5.doc, NPSTC Broadband Working Group, <http://www.npstc.org/documents/Functional%20Description%20MCV%20v5.doc>

Senator Slade Gorton, U.S. Senate (1981-1987; 1989-2001) and former member of the 9/11 Commission, concurs:

A failure to share information contributed to every one of the 9/11 Commission's ten lost 'Operational Opportunities'. Subsequently, in 2009, the Markle Foundation Task Force identified American public safety communications as still requiring significant improvements to meet today's law enforcement challenges. In order to maximize information sharing, future public safety communications systems should include direct, man-to-man communications that continue to operate when infrastructure fails. Only with the guarantee of such direct communications can we minimize the risk of additional missed 'Operational Opportunities'.⁶

CoCo recommends two modifications to the current plans that will mitigate its critical functional shortfalls.

First, the Commission must include some concept of a Direct or “Talk Around” communications method to support operational needs when infrastructure-based communications are unavailable. This is already supported by many national working groups and local jurisdictions. CoCo refers to this capability as “Man-to-Man Communications” (M2MC). Without this capability, current plans will not fully address user requirements, and broadband adoption as a primary means of voice communications will never be achieved.

Second, CoCo believes that a truly nationwide, broadband, and interoperable public safety network should be interoperable with all available public safety broadband. Although current NBIPSN plans are focused primarily on 700MHz bands, the Fourth Further Notice discusses complementing this 700MHz spectrum with other spectrum, such as the 4.9GHz band. The Commission must recognize that – unless it pursues a network architecture that accommodates all public safety broadband regimes – the current plan will deliver a network that will not be uniform and will not deliver the full capabilities of our nation’s

⁶ Senator Slade Gorton e-mail to CoCo.

assets to our first responders. Modifying the NBIPSN architecture to support this spectral diversity is a policy decision supported by technology that is already widely available and consistent with commercial best practices.

DISCUSSION

I. THE PROPOSED NATIONWIDE BROADBAND INTEROPERABLE PUBLIC SAFETY NETWORK MUST ACCOMMODATE THE CAPABILITY FOR DIRECT MAN-TO-MAN OR TALK AROUND COMMUNICATIONS.

The current plans for the NBIPSN do not support mission critical off-network communications, and will thus reduce the functionality of current public safety communications, which is an untenable proposition. Public safety officials must be able to continue to talk to each other when a system's towers are unavailable, due to disaster, congestion, or other coverage issues. Therefore, the proposed NBIPSN must add the support for man-to-man communications (M2MC) the NPSTC Broadband Working Group has identified as an absolute requirement for any mission-critical voice communications.⁷

The State of Washington's King County has made this issue a primary concern. In a 22 October 2010 letter to Commerce Secretary Gary Locke and FCC Chairman Julius Genachowski, King County officials cite the need for systems that do not fail:

Mission-critical public safety services, by nature, differ from commercial infrastructure. For example, public safety systems must never fail, must enable one-to-many voice communications, and must cover all populated areas as well as many other areas not commercially desirable to serve. If the U.S. government wants to encourage public safety to use commercial services, those commercial services must meet public safety's stringent requirements.⁸

Support for M2MC in the NBIPSN architecture would not only reduce the number of scenarios that would cause the overall system to fail, it would also address many of the other shortfall issues identified

⁷ Functional Description MCV v5.doc, NPSTC Broadband Working Group

⁸ 22 October 2010 letter from Dow Constantine, King County Executive; Sue Rahr, King County Sheriff; and Kathy Lambert, Government Accountability & Oversight Committee Chair to Commerce Secretary Locke and FCC Commissioner Genachowski

in the Fourth Further Notice. It would enable improved communications where infrastructure is not available, such as natural disasters, dark spots, isolated operations deep inside buildings, a complete lack of any infrastructure-based connectivity, and local access when public safety officials roam outside of coverage areas.

Leaders in the land mobile radio and dispatch equipment community concur, based on their experience with a variety of local first responder organizations:

In Zetron's opinion, based on observations of our public safety user base, direct handset-to-handset communications at tactical scenes (commonly known as Talk Around or Direct Mode) is an essential mode of communications for public safety users. Talk Around has the advantage of allowing communication between on-scene responders even if the scene has little or no coverage by the public safety radio networks. It also frees the public safety radio network from the intense voice traffic that occurs at the scene of incidents, ensuring that network channels are available for routine traffic and for dispatching newly emerging incidents.⁹

Unfortunately, the 3GPP and LTE standards proposed by the Commission do not support any concept of direct, peer-to-peer, or non-infrastructure-based M2MC.¹⁰ This technology limitation is imposed primarily by a policy decision to view the NBIPSN as only an infrastructure-based network. The limitation is not bound by current technology capabilities. Infrastructure-independent broadband M2MC technology exists today and has been tested in a variety of operational environments.¹¹

If 3GPP and LTE standards are not able to be modified to support M2MC, M2MC capabilities could still be delivered in a cost-effective method, using technology available today, but it would require support for multiband communications, as identified below.

⁹ Ellen O'Hara, CEO, Zetron; 31 March 2011 e-mail to CoCo

¹⁰ 3GPP LTE-Advanced, <http://www.3gpp.org/LTE-Advanced>

¹¹ U.S. Department of Defense Joint Tactical Radio System (JTRS), <http://www.public.navy.mil/jpeoitr/Pages/Welcome.aspx>

II. THE COMMISSION MUST AGGRESSIVELY PURSUE A TRULY UNIFORM NETWORK ARCHITECTURE THAT AUGMENTS THE 700MHZ SPECTRUM BLOCK WITH OTHER SPECTRUM BANDS IN ORDER TO ADDRESS COVERAGE AND CAPACITY ISSUES.

CoCo supports the Commission's efforts to address public safety requirements for broadband wireless communications through the use of the 700MHz band. The 700MHz spectrum allocation will enable a host of new information sharing and interoperability capabilities our nation needs to improve day-to-day coordination, as well as emergency response. CoCo also supports the Commission's interest in delivering a "uniform" architectural framework to promote interoperability.¹²

The operational motives for augmenting the 700MHz spectrum with other spectrum bands are coverage, in-building communications, and deployable assets.

The expected coverage gaps in the planned 700MHz network are well-known. The Fourth Further Notice highlights assumptions that any planned network is expected to have only 95% coverage. Unfortunately, this 95% figure is derived using best-case deployment scenarios, with highly tuned and optimized tower equipment, and no expectation of outages created by natural disasters.

During any outages, including natural disasters, coverage will fall well below 95%. Cells on wheels (COWs) and cells on light trucks (COLTs) are expected to augment any failed infrastructure,¹³ but they will never match the coverage of the original infrastructure, due to difficulties in tuning and optimizing coverage, positioning antennas, and in maintaining a large enough inventory of these emergency assets.

Therefore, it is clear that addressing all coverage issues, with only the 700MHz band and a tower-based infrastructure approach, will be very difficult and possibly cost prohibitive.

The Fourth Further Notice hints at the topic of complementing 700MHz spectrum with fixed broadband spectrum,¹⁴ and CoCo strongly endorses this concept of using complementary spectrum as a method for addressing coverage and in-building communications problems.

¹² Fourth Further Notice, ¶17

¹³ Fourth Further Notice, ¶127

¹⁴ Fourth Further Notice, ¶131

The complementary use of more than one spectral region in a single system is referred to as multiband communications. Commercial carriers have already embraced multiband communications to solve the same problems that will face users of the NBIPSN: access, coverage, and capacity concerns. Carriers openly address these capacity issues, often referring to multiband technologies as “Broadband Offload” or “3G Offload.”¹⁵ Any use of satellite communications, such as those provided by INMARSAT, is also considered a multiband system.

Because of this pre-existing commercial interest, public safety multiband communications systems will not require significant additional investment or technology development. Current versions of “Smartphones”, such as the iPhone or Motorola Droid, already support tri- or quad-band wireless communications – cellular voice, 3G data, WiFi, and Bluetooth. Commercial carriers already use low-cost “Cellular Hotspots,” such as the Verizon MiFi, to seamlessly route information from one network (WiFi) to another (3G).

In addition to these commodity technologies, the private sector continues to innovate in this area, in ways that are directly applicable and relevant to public safety communications.

Qualcomm has developed a technology by the name of FlashLinq, which supports peer-to-peer and device-to-device communications in unpaired, licensed spectrum. This technology creates a form of so-called “Proximal Communications,” allowing thousands of users to discover and directly communicate with one another at broadband speeds at ranges of up to several hundred meters. This technology could work in conjunction with an LTE network in other spectral regions to provide a complete interoperable, peer-to-peer, device-to-device solution for first responders and other public safety officials.¹⁶

Given that this multiband technology is currently available from a variety of providers and indications that commercial vendors view them as critical and worthy of continued investment, it is clear there is a

¹⁵ Ruckus Wireless, <http://www.ruckuswireless.com/carriers/3g-offload>; BelAir Networks, <http://www.belairnetworks.com/applications/index.cfm/intSolutionID/2/intApplicationID/7>

¹⁶ 30 March 2011 e-mail from Dean Brenner, VP, Government Affairs, Qualcomm Incorporated, to CoCo

strong foundation for the use of multiband technology and concepts in the NBIPSN architecture. And, given that current plans to use only 700MHz spectrum and a centralized infrastructure (tower-based) approach will create several well-documented issues related to access, including: the expectation of 5% coverage gaps in covered areas,¹⁷ problems with in-building communications,¹⁸ and deployable assets,¹⁹ it also seems reasonable to aggressively pursue a multiband architecture.

A specific example of how multiband communications could help address public safety challenges is with in-building communications. In this example, police officers responding to a situation in a below-ground parking garage are equipped with hypothetical multiband public safety devices. One of the bands would access the wide-area coverage 700MHz NBIPSN. A secondary band might provide more local, man-to-man communications.

Police officers deep in the garage are likely to be operating in a 700MHz coverage dark spot. If the NBIPSN supported a multi-band architecture, the police officers would be able to create a man-to-man mesh inside the building using the secondary band. To have his or her communications escape the dark spot, an officer would first connect to another officer over the man-to-man mesh, and then to another officer over that mesh, and so on, until the communications reached an officer with coverage in the 700MHz NBIPSN. At that point, the multiband device would route the original officer's communications from the local area coverage mesh to the wide area coverage 700MHz network. The multiband public safety devices described in this scenario are essentially the same as the currently available smartphone devices described earlier in this document, and the multihop mesh capabilities are also already available.

A side effect of this coverage extension through the use of multiple spectral regions is that it would reduce requirements for equipment power and tower density for the primary coverage tower network, possibly reducing overall costs of a nationwide 700MHz network build out.²⁰

¹⁷ "Support of a minimum level of coverage reliability (95%)," Fourth Further Notice, ¶19; Fourth Further Notice ¶75

¹⁸ Fourth Further Notice, ¶126

¹⁹ Fourth Further Notice, ¶128

²⁰ Fourth Further Notice, ¶12

In addition to solving coverage issues, the overall capacity of a unified NBIPSN would be greatly enhanced with the combination of 700MHz and complementary spectrum. The current plan addresses 700MHz capacity issues²¹, with 20MHz of spectrum. Capacity issues could be minimized by also using bandwidth available in other spectral regions. To address capacity concerns all commercial cellular carriers are currently pursuing some form of “3G Offload,” to share cellular bandwidth demands across both a cellular and a WiFi-based fabric. Capacity concerns exist in spite of the carriers’ massive resources and the availability of competitively-priced infrastructure components.

An NBIPSN architecture without support for a network that spans multiple spectrum ranges is short-sighted for several reasons. First – and foremost – the single band approach has well-known coverage problems. Keeping responders connected to the highest degree possible should be a primary design consideration. Second, the nation’s public safety agencies are already deploying communications solutions across multiple wireless bands. As noted, there are no technological reasons for keeping these approaches separate. CoCo believes that in a time of crisis, all available network resources should be available to our nation’s public safety officers, without regard to which spectrum they access. Third, a single band approach is not as cost effective as a multiband approach. An isolated, single band approach will encourage overbuilding of a tower network to solve problems that might be better solved by non-tower, non-700MHz systems. And, a single band approach encourages the nation’s various public safety agencies to make suboptimal tradeoffs when acquiring federally-funded systems that operate outside of the 700MHz band. Therefore, the Commission should thoroughly review the range of current options and integrate current multiband concepts into the NBIPSN architecture.

CONCLUSION

CoCo urges the Commission to a) require Man-to-Man Communications in the NBIPSN architecture in order to support the needs of off-network mission critical voice communications; and, b) vigorously pursue and investigate a unified NBIPSN architecture that supports the concept of multiband operations

²¹ Fourth Further Notice, ¶63

and brings all of our country's resources to bear on improving public safety communications. In the absence of standards for either of these recommendations, the Commission must either propose its own standards or appoint an independent public safety user group to develop them. Both of these recommendations are consistent with Commission goals, are achievable with currently-available technology, are consistent with commercial best practices, will potentially reduce the overall operating costs of the NBIPSN, and – most importantly – will deliver the most robust broadband services possible for our nation's public safety officers.

Respectfully submitted,

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